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Experiment Station

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SPEED OF TAPPING DOES NOT INFLUENCE MAPLE SAP YIELDS

Abstract.—Results of this study showed no statistical difference in the quantity or sweetness of sugar maple sap collected from tapholes that were drilled with a variety of tappers running at different drilling speeds.

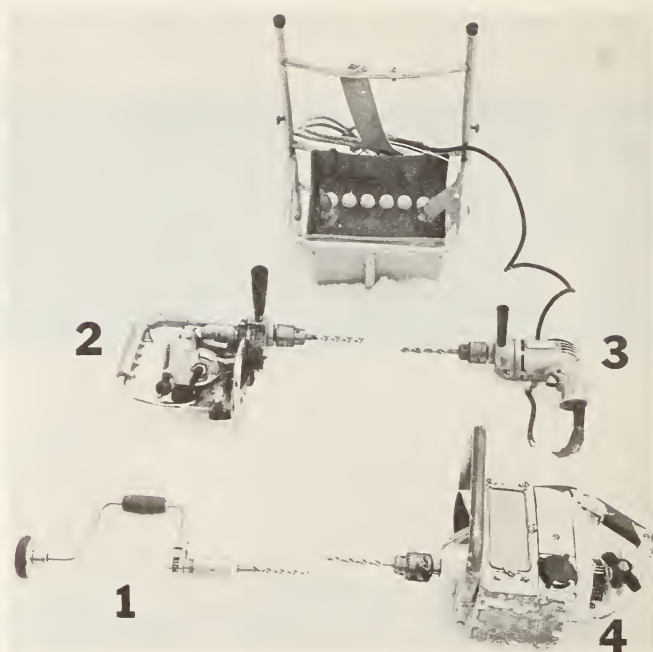
In recent years, with the modernization of the sugar maple industry, new tappers have been developed for drilling holes into sugar maple trees. A few people in the industry are concerned about using tappers that have the drill revolving at a high rate of speed. Several have said that the high speed of the drill scorches or burns the taphole tissues, in effect cauterizing the tissues surrounding the taphole. This, they feel, results in the plugging of cells where the sap comes from.

Our study indicated that there was no statistical difference in the amount of sap or the sweetness of the sap collected from tapholes made with drills revolving at various speeds.

The Study

Fifteen trees were used in this study. Four tapholes were drilled in each tree. These tapholes were drilled to a wood depth of 3 inches, using a 7/16-inch drill bit; and a 250-milligram paraformaldehyde pellet was placed in each taphole to increase sap yields by preventing the buildup of micro-organisms that clog the woody sap-producing cell tissues.

The four types of tappers used to drill tapholes in sugar maple trees. 1, a hand auger. 2, a small gasoline-powered drill. 3, a battery-powered electric drill. 4, a gasoline-powered chainsaw drill.



Four types of tappers were used to drill the tapholes: a hand auger, a battery-powered drill, a gasoline-powered drill, and a chainsaw drill (fig. 1). The drill speeds for these tappers were:

	<i>R.p.m.</i>
Hand auger	120
Battery drill	400
Power drill	935
Chainsaw drill	6,600

In drilling the tapholes, a new drill bit was used for each tapper, and the tapping treatments were assigned at random to one of the four tapholes on each of the 15 trees. All tappers were used at the above designated speeds (the speed for the hand auger was an estimated speed).

The trees were tapped on 3 March 1970. The temperature at this time was between 20 and 22°F. When the trees were tapped, sap oozed out of the tapholes; and steam was observed coming from some tapholes made with the high-speed tappers. This presence of sap and steam, common at cold temperatures, may cause producers using the faster tappers to believe that the steam is smoke from burning wood.

Sap-volume yields, measured to the nearest 0.25 liter, were collected from each taphole during each sap-flow period, and sap-sugar yields were

recorded and measured to the nearest 0.1 percent, using a sugar refractometer. We used an F-test to analyze total seasonal sap yields and average sap-sugar concentration for each taphole treatment.

Results

Though many sap producers believe that high-speed tapping might be detrimental to sugar production, we found no statistical differences in sap-volume yields collected from any of the drilling-speed treatments used. Also, no difference in sap sugar yields resulted because of drill speed. The average seasonal sap-volume yields and sap-sugar percentages for each tapper treatment were:

	<i>Sap-yield</i> (liters)	<i>Sap-sugar</i> (percent)
Hand auger	805.5	2.5
Battery drill	965.5	2.4
Power drill	756.5	2.5
Chainsaw drill	857.5	2.4

It might appear that the sap-volume yields would be statistically different from one another, but due to the variation in volume yield among treated tapholes, differences were non-significant ($F_{42,3} = 1.89$; $F_{.05} = 2.83$). The variation in these data did not follow any discernible pattern or trend among sample trees. Sap-sugar values varied by only 0.1 percent for the four treatments.

Conclusion and Application

Sap-volume yields and sap-sugar concentrations were not affected by the speed of the tappers used to drill tapholes in the sugar maple trees. Tapping speeds varied from slow (hand auger at an estimated 120 r.p.m.) to 6,600 r.p.m. (chainsaw drill). This range of tapping speeds was considered adequate to cover the tappers presently available to the producers.

Although we found no difference with the various types of tapping speeds used in this study, we want to emphasize that the trees were tapped when the temperatures were in the low 20's, and sap oozed out of these fresh tapholes. We do not expect that tapping at a time when temperatures are either higher or lower than those encountered in this study will yield any different results. However, other temperatures were not tested.

Sugar producers should not hesitate to use the higher speed tappers to drill tapholes into sugar maple trees.

— H. CLAY SMITH and RICHARD J. LAMORE

Northeastern Forest Experiment Station
Forest Service, U.S. Dep. Agriculture
Burlington, Vermont

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